



U.S. Department of Housing and Urban Development

Data Center Optimization Initiative Strategic Plan (FY2016 - FY2022)

May 10, 2021



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1. Purpose

The purpose of this Strategic Plan is to provide information on Housing and Urban Development's (HUD) data center closures and provide required optimization metrics, as prescribed by the Office of Management and Budget (OMB), and identify the major milestones associated with how HUD intends to achieve OMB's target goals for cost savings and data center closures. *As of FY2018, HUD has completed its multi-year data center consolidation and reduction initiative and is now in full compliance with Federal-wide DCOI guidance and as a result, no other milestones will be discussed in this Plan.*

2. Background

In accordance with requirements defined by the Federal Information Technology Acquisition Reform Act (FITARA),¹ beginning in FY2016, agencies shall annually publish a Strategic Plan to describe agency's data center consolidation and optimization strategy for fiscal years starting in 2016. To this end FITARA requires that all agencies submit annual reports that are to include comprehensive data center inventories, multi-year strategies to consolidate and optimize data centers, performance metrics and a timeline for agency activities, and yearly calculations of investment and cost savings.

Pursuant to FITARA, the Administrator of the Office of E-Government and Information Technology (now referred to as the Office of the Federal Chief Information Officer (OFCIO)) is required to establish and publish cost savings and optimization improvement goals, provide public updates on cumulative cost savings and optimization improvements, and review agency's data center inventories and the implementation of data center management strategies.

To assist with this Strategic Plan submission effort, Tony Scott, former Federal CIO, published additional guidance in a Management and Budget (OMB) memorandum dated August 01, 2016, titled Data Center Optimization Initiative (DCOI), which was addressed to Heads of Executive Departments and Agencies (M-16-19). This guidance provides a list of deliverables and required content along with submission dates which should guide the agency's compliance efforts.

Although similar in scope to the DCOI Strategic Plan's list of required deliverables, the list of deliverables/metrics which HUD is required to provide the Government Accounting Office (GAO) is more comprehensive and will be provided to the GAO under separate cover.

¹ Title VIII, Subtitle D of the National Defense Authorization Act (NDAA) for Fiscal Year 2015, Pub. L. No. 113-291



3. Strategic Plan

HUD has long operated a “right-sized” approach to IT operations with consolidation of its data centers and outsourcing of its infrastructure. Beginning in 1995, HUD began efforts to significantly reduce the number of agency data centers and reduce the total cost of data center operations in response to OMB Bulletin No. 96-02, *Consolidation of Agency Data Centers*. Since then, HUD has continued to be a leader in Federal agencies in consolidation of IT operations, outsourcing of IT operations and virtualization of its server and storage capacity.

Since 2005, HUD has operated in a fully outsourced infrastructure mode providing consolidated departmental IT operations in hosting, storage, data transport, user environments and systems integration, with off-site disaster recovery for all systems, including email and Microsoft SharePoint services. The infrastructure managed services are provided under the HUD Information Technology Services (HITS) program in the form of three contracts: Data Center Services (DCS) contract, HITS CS Bridge contract and End-User Support contract. Under HITS, HUD’s DCS service provider has virtualized the non-mainframe environments, providing highly available services for hosting, operations, and robust storage capabilities in support of HUD mission. This highly virtualized environment allowed HUD’s information systems consolidation and data center reduction efforts to be less complex as all servers and other components did not need to be physically relocated. With the use of available tools and utilities, all of HUD’s non-mainframe systems have been relocated to multi-tenant, shared data centers and required no down time. They were virtually relocated while ‘hot’ with no impact to the Public, partners and providers.

Additionally, because of the highly stable, virtualized environment provided by our HITS partners, HUD has been afforded the opportunity to migrate existing information systems to the “Cloud.” In addition, HUD initiated Agile and Continuous Integration/Continuous Delivery (CI/CD) projects and associated technologies and processes that are used in the design, development, implementation and maintenance of new information systems that will be implemented in the Cloud.

As described above, HUD’s data center closures, consolidation and optimization efforts, which were completed in Q4FY2018, form a continuum of sequential events that continue to augment and enhance the capabilities of the predecessor. As a result, HUD is strategically well positioned to continue its information systems optimization and Cloud migration efforts.



3.1 Optimization Metrics Description

Since HUD has consolidated IT operations and reduced the number of commercially co-located data centers by migrating operations into multi-tenant, shared services data centers and the Cloud, the “DCIO optimization metrics” fall into two categories that are best described as:

1. HUD reportable
2. Owner/Manager of the Data Center Facility reportable

Of the seven DCOI reportable metrics, the HUD reportable metrics only include the two listed below:

1. Data Center Closures
2. Cost Savings and Cost Avoidance

The owner/operator of the multi-tenant, shared services facility is required to submit “facility based” DCOI metric data on the remaining five metrics, and these are:

1. Facility Utilization
2. Energy Metering
3. Power Usage Effectiveness
4. Virtualization (Physical server to Virtual server ratio)
5. Server Utilization and Monitoring

In order for the owner/operator of the multi-tenant facility to accurately report the facility-based metrics, HUD is required to collect and provide Virtualization and Server Utilization and Monitoring data from its IT systems. Once provided, the owner/operator of the shared services data center facility will then factor HUD’s data into the DCOI reportable, facility calculations.



3.2 Data Center Closures

HUD's target value for data center consolidation and closures requires that HUD continues with its data center closure and consolidation plan initiated in 2014 by reducing the number of data centers supporting HUD's IT services by one (1), with the goal of completing in FY2018. This goal was achieved in Q4FY2018.

To achieve this goal, HUD consolidated its IT infrastructure, application services and resources from contractor owned facilities to multi-tenant, shared data centers and the "Cloud.". This effort was accomplished under the HUD Enterprise and Architecture Transition (HEAT) initiative that restructures infrastructure services.

3.3 Cost Savings & Cost Avoidance

Since HUD's data center consolidation effort started over 15 years ago and concluded in 2018, HUD is not claiming specific quantitative impacts under the current DCOI initiative. The chart below demonstrates this by listing the targeted Federal Cost Savings Target along with HUD's target for Cost Savings and Avoidance, which is \$0.00 through FY2021.

Federal Cost Savings Target

FY2014 Physical Data Center Spending	Total Savings Targeted by FYE2018
\$5.4 billion	\$2.7 billion

HUD Cost Savings and Cost Avoidance

FY2021 Target	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00



DATA CENTER OPTIMIZATION INITIATIVE (DCOI) STRATEGIC PLAN * FY2016-FY2022

The chart below contains the DCOI metric categories and the calculations used to derive the reportable numbers.

Table 1: Optimization Metrics

HUD is responsible to report on the following two DCOI optimization metrics.

ID	Metric	FY18 OMB Target	FY16 Planned	FY17 Planned	FY18 Planned	FY19 Planned	FY20 Planned	FY21 Planned	FY22 Planned	Calculation
1	Tiered Data Center Closures	1	0	1	1	0	0	0	0	OMB OFCIO to provide closure goal
2	Cost Savings and Avoidance*	0	0	0	0	0	0	0	0	≥ 25% of FY2016 IT Infrastructure Spending Data submitted to Federal IT Dashboard (M-16-19)

* The Cost Savings and Cost Avoidance dollars have previously been recognized; as a result, there are no additional dollars to recognize in FY's 2016 through FY 2022.

DCOI Optimization Metrics #3-7 are reported at the Facility level. HUD, as a Data Center facility tenant, will provide "Virtualization and Utilization/Monitoring" data to NASA for submission as the Inter-agency Shared Services Provider (ISSP).

ID	Metric	FY18 OMB Target	FY16 Planned	FY17 Planned	FY18 Planned	FY19 Planned	FY20 Planned	FY21 Planned	FY22 Planned	Calculation
3	Facility Utilization	≥ 80%	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	$\frac{\text{Active Rack Ct.} * 30 \text{ sq.ft.}}{\text{GFA Total}}$
4	Energy Metering	100%	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	$\frac{\text{GFA of Energy Metered Data Centers}}{\text{GFA Total}}$
5	Power Usage Effectiveness (PUE)	≤ 1.5	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	$\frac{\text{Total Data Center Energy Used}}{\text{Total IT Equipment Energy Used}}$
6	Virtualization	≥ 4	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	$\frac{\text{Total Physical Server Count} + \text{Total Virtual OS}}{\text{Total Physical Server Count}}$
7	Tiered Server Utilization & Automated Monitoring	≥ 65%	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	Average Server Utilization * % of Data Centers fully equipped with Automated Monitoring

* N/A - HUD is a tenant in an Inter-Agency Shared Services Provider (ISSP); therefore, the ISSP (NASA-Stennis) assumes the OMB DCOI data submission requirement.

HUD will provide metrics specific to its IT infrastructure, “Virtualization” and “Server Utilization & Automated Monitoring,” for inclusion in the facility-based metrics.



4. Master Program Schedule

HUD achieved its consolidated, end-state IT infrastructure architecture in FY2018 and will continue the optimization process by migrating systems and applications to the Cloud where possible, and after careful analysis.

5. Risk Management and Mitigation

The Department employs several methodologies for tracking and mitigating risks at the three levels: project, component/system and data center.

- **Project-level Risks:** primarily a function of applicable infrastructure program management oversight for a given project; project risks are tracked in a centralized database along with other PM documentation and templates. Risks are reviewed within the project team and presented using established templates on a weekly basis to the OCIO Office of Infrastructure and Operations leadership team. Matters are escalated as appropriate.
- **Component/System Risks:** System-level risks are the responsibility of the system owners. All systems that rely on the HITS data centers and system owners and administrators, work in partnership with the OCIO Office of Infrastructure and Operations leadership team to identify and mitigate risks and response to issues.
- **Data Center:** Data center risks are associated with meeting contract acquisition milestones. Any acquisition delays will impact HUD's ability to complete all data center operational activities. Consequently, current and future data center-related contracts (and related funding needs) are identified as a Departmental priority and monitored accordingly.

The Department continues to consider consolidation and optimization challenges and lessons learned from its own experiences and relevant experiences from state and local efforts, case studies, and from the efforts of all other federal agencies associated with the Data Center Optimization Initiative. These lessons learned will be used as we accelerate and expand our migration into the Cloud, while driving towards:

1. Greater economies of scale,
2. Flexible, demand-driven computing performance,
3. Secure, demand driven data capacity and retention; and,
4. Increased accessibility (devices and speed)



6. Communications Strategy

The communications strategy for HUD data center optimization initiative is commensurate with the complexity and pervasiveness of a specific effort. Since consolidation efforts completed in FY2018 additional optimization efforts will be devoted to application migration to the Cloud. Note that migration to the Cloud is out of scope for the Data Center Optimization Initiative as defined by OMB. The communications surrounding these efforts will include OCIO staff, program offices, partners, developers, contract staff, Cloud providers and the Public as appropriate in order to set expectations related to schedule, functionality and cost.